

## 甲第 4 号証

⑨日本国特許庁(JP)

⑩特許出願公告

⑪特許公報(B2)

昭54-11250

⑫Int.Cl.2

識別記号

⑬日本分類

庁内整理番号

⑭公告 昭和54年(1979)5月14日

B 23 K 15/00

12 B 11

6570-4 E

発明の数 1

(全 2 頁)

1

2

## ⑮電子線加工法

審 判 昭 50-6715

⑯特 願 昭 46-7083

⑰出 願 昭 46(1971)2月18日

公 開 昭 47-29239

⑱昭 47(1972)11月4日

⑲発 明 者 長谷隆裕

東京都港区芝5の33の1日本電  
気株式会社内

⑳出 願 人 日本電気株式会社

東京都港区芝5の33の1

㉑代 理 人 弁理士 内原晋

㉒引用文献

特 公 昭 39-27522

## ㉓特許請求の範囲

1 電子線を用いて突き合せ溶接を行なう際に、被溶接物の片方の部材または両方の部材に突出部を作り、前記片方の部材の突出部または両部材の突出部の突き合せ部を通して電子線を照射して溶接をし、しかる後該突出部を除去することを特徴とする電子線加工法。

## 発明の詳細な説明

本発明は、電子線を用いて溶接を行なう際の電子線加工法に関するものである。

通常、電子線を用いて突き合わせ溶接を行なうには、第1図に示すように、被溶接物1と2との接合面4に直接電子線3を照射して、溶接する電子線加工法を用いる。

然しながら、上記方法を用いる際に、被溶接物1、2の材質とか突き合わせ面4の密着度とか裏ビードの有無等により、裏ビード近傍にしばしばアンダーカットを生じる。たとえば、チタンとかマグネシウム合金等の材料はアンダーカットを生じ易い、また接合面の密着度が良くないときとか裏ビードを多く形成させる時にもアンダーカ

ットを生じ易い。

このアンダーカットが被溶接物に残されたまま、被溶接物が機械的応力を受けるならば、応力集中による被溶接物の破壊の原因になる事が考えられる。従つて、溶接の際のアンダーカットは是非ともさけなければならないことは周知のことである。

本発明の目的はこのアンダーカットを防止し、機械的強度を十分持った電子線加工法を提供するものである。

本発明によれば、電子線を用いて突き合せ溶接を行なう際に、被溶接物の片方の部材または両方の部材に突出部を作り、この突出部を通して溶接することを特徴とする電子線加工法を得る。

15 以下図により本発明を詳細に説明する。

第2図に、本発明による電子線加工法の一実施例を示す。これは2個の被溶接物5、6を電子線を用いて突き合せ溶接を行なう際に、これらのどちらが一方(第2図では5)に突出部を作り、溶接面をおおう。

この状態にて前記突出部を通して電子線7を溶接面に照射し溶接を行なう。ただし、この場合、溶接線は、突出部により隠されているため、あらかじめ突出部表面の電子線照射位置にけがき線を入れておくとか、溶接線が電子線照射位置と一致するように被溶接物をセットしておくことが必要となる。

さて、第2図に示された加工法で溶接を終え、アンダーカットを生じた突出部を、機械的に切削除去すれば良好な被溶接物が得られることになる。

また、この突出部の大きさは、被溶接物の板厚、材質、接合面の粗さ、形成するべき裏ビードの大きさ等によつて決定される。

以上で、本発明の原理的説明を終るが、実用的には次の第3図、第4図に示す本発明による実施例としての電子線加工法が簡易な場合もある。

第3図に示した実施例は2個の被溶接物8、9

(2)

特公 昭54-11250

を電子線を用いて突き合せ溶接を行なう際に、それらの両方に突出部を作り、この突出部を通して電子線10を照射し溶接を行なう。このような形状の突出部にすれば溶接後の切削加工は、第2図のそれに比べて容易になる。

次に、第4図に示した実施例は、円筒形の被溶接物11に被溶接物たるふた12を溶接する場合に用いる電子線加工法であり、電子線を用いて突き合せ溶接を行なう際に、被溶接物たるふた12は円筒形の被溶接物11の内径より外側に突出部10を作り、その突出部を通して電子線13を照射しながら、これらの被溶接物を中心線の周囲に回転して溶接を行なう。その後円筒形の被溶接物11

の上方に出た被溶接物たるふた12の上部の切削加工を行なう。原理的には第2図と同様である。

以上のべたごとく、本発明を用いることにより、アンダーカットの生じ易い被溶接物に対して有効な防御方法となる効果がある。

図面の簡単な説明

第1図は従来の電子線加工法を示し、1、2は被溶接物、3は電子線、4は接合面である。第2図、第3図、第4図は本発明による電子線加工法の実施例を示し5、6、8、9は被溶接物、7、10、13は電子線、11は円筒形の被溶接物、12は被溶接物たるふたを示す。

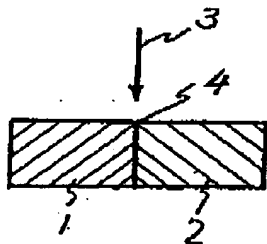


図 1

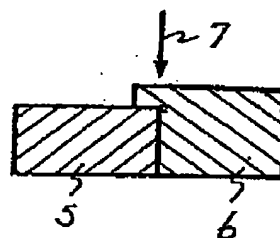


図 2

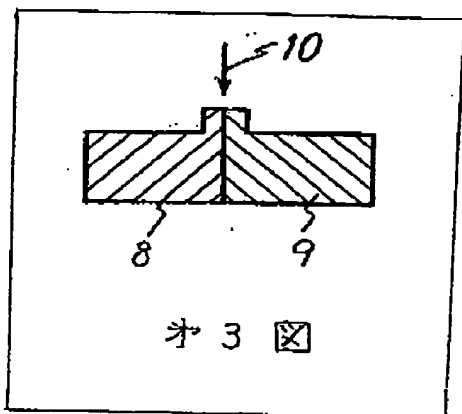


図 3

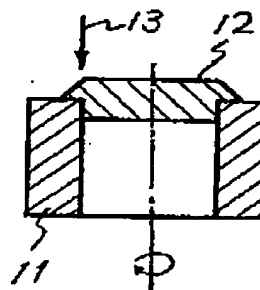


図 4

**Japanese Patent Publication No. Sho 54-11250**

Publication date: May 14, 1979

Title of the Invention: Electron Beam Processing Method]

Application No: Sho 46-7083

Application Date: February 18, 1971

Inventor: Takahiro Hase

Applicant: Nippon Electric Corp. (NEC Corp.)

**Claims:**

1. An electron beam processing method characterized in that  
in a case where using an electron beam an abut welding is carried out,  
forming a projection portion to one member of a member to be  
subjected a welding or both members of said members to be subjected a  
welding;  
by radiating said electron beam to said projection portion of said one  
member or said projection portions of said both members, welding said  
projection portion through an abutted portion; and  
after that removing said projection portion.

**Detailed Description of the Invention:**

The present invention relates to an electron beam processing method

for carrying out a welding using an electron beam.

Usually, when the abut welding is intended to carry out using the electron beam, as shown in Fig. 1, an electron beam processing method is employed, namely to a joining face 4 formed between one member 1 to be subjected the welding and another member 2 to be subjected the welding an electron beam 3 is radiated directly the joini ng face and the members are welded.

However, when the above stated method is used, in accordance with the materials of the member 1 to be subjected the welding and the member 2 to be subjected the welding and the adhere degree of the abutted face 4 and th e existence of the back bead, the under-cut portion will occur often in a vicinity of the front bead. For example, in the case of the material such as a titanium alloy, a magnesium alloy etc., the under -cut portion will occur easily and further the under-cut portion will occur easily when the adhere degree of the joining face is bad, and many back beads are intended to form.

When the member to be subjected the welding is received the mechanical stress, leaving the above stated under-cut portion to the member to be subjected the welding, it will produce the cause for destroy of the member to be subjected the welding according the stress concentration. As a result, it is well known that the under-cut portions during the welding will be avoided inevitably.

An object to of the present invention is to provide an electron beam processing method wherein the under-cut portion should be prevented and the

mechanical strength is obtained fully.

According to the present invention, when the abut welding is carried out using the electron beam, it can obtain the electron beam processing method characterized wherein the projection portion is formed on one member of the member to be subjected the welding or on both members of the members to be subjected the welding and then through the projection portion the welding is carried out.

Hereinafter, the present invention will be explained in detail using the drawings.

Fig. 2 shows one embodiment of the electron beam processing method according to the present invention. In this figure, when the abut welding using the electron beam is carried out to two members 5, 6 of the members to be subjected the welding, the projection portion is formed on one of the two members (in Fig. 2, the member 6) and then this covers the welding face.

With this condition, the electron beam 7 is radiated to the welding face through the projection portion and then the welding is carried out. However, in this case, since the welding line is hidden by the projection portion, it is necessary to perform that the laying-out line is formed in advance on the electron beam radiation position of the surface of the projection portion or to coincide the welding line with the electron beam radiation position the members to be subjected the welding are set.

Here, the welding has finished using the processing method shown in Fig. 2, and when the projection portion in which the under-cut portion was

caused is removed mechanically, then the good member to be subjected the welding is obtained.

Further, the largeness of the projection portion is determined according to the plate thickness, the material of the member to be subjected the welding, the roughness degree of the joining face and the largeness of the back bead to be formed, etc.

Hereinabove, the principle explanation of the present invention has completed, but in the practical use the simple cases of the electron beam processing methods will be used by the following embodiments shown in Fig. 3 and Fig. 4 according to the present invention.

The embodiment shown in Fig. 3, when the abut welding using the electron beam is carried out to two members 8, 9 of the members to be subjected the welding, the projection portions are formed on both two members. The electron beam 10 is radiated through the projection portions and then the welding is carried out. When the projection portions having this shape are formed, the deletion processing after the welding will become easier than that shown in Fig. 2.

Next, the embodiment shown in Fig. 4 shows the electron beam processing method, which is used in the case where the lid 12 being the member to be subjected the welding is welded to a cylindrical shape member 11 to be subjected the welding. During the carry-out of the abut welding using the electron beam, the projection portion is formed at the outside from the inner diameter of the cylindrical shape member 11 to be subjected the welding and

the electron beam 13 is radiated through the projection portion and rotating the member to be subjected at the periphery of the center line and then the welding is carried out. After that, the deletion processing of the upper portion of the lid 12 being the member to be subjected the welding, which projects at the upper portion of the cylindrical shape member 11 to be subjected the welding, is carried out. In the principle aspect, the method is similar to that shown in Fig. 2.

As stated in above, by employing the present invention, against the member to be subjected the welding in which the under cut portion is caused easily, there are the effects in which the effective protection method can give.

#### Brief Description of the Drawings:

Fig. 1 shows an electron beam processing method according to the prior art, in which reference numerals 1, 2 indicate members to be subjected the welding, a reference numeral indicates an electron beam, and a reference numeral indicates the joining face; and

Fig. 2, Fig. 3 and Fig. 4 show embodiments according to the present invention, in which reference numerals 5, 6, 8 and 9 indicate members to be subjected the welding, reference numerals 7, 10, 13 are electron beams, a reference numeral 11 indicates a cylindrical shape member to be subjected the welding, and a reference numeral 12 indicates a lid being a member to be subjected the welding.

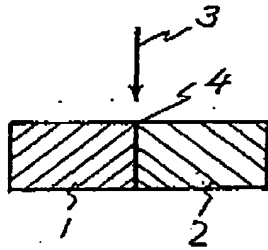


Fig. 1

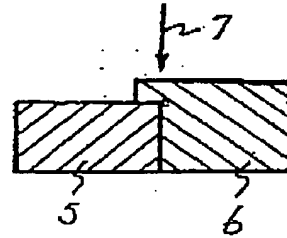


Fig. 2

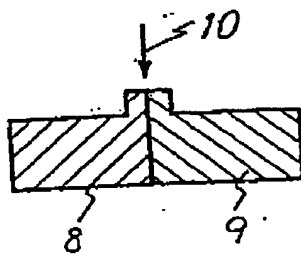


Fig. 3

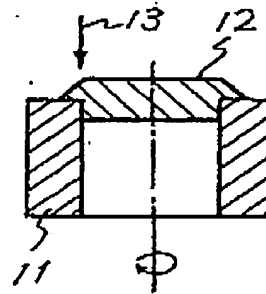


Fig. 4